UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON
AT SEATTLE

NXP USA, INC., and NXP B.V., Plaintiffs, v. IMPINJ, INC., Defendant.	CASE NO. 2:20-cv-01503-JHC CLAIM CONSTRUCTION ORDER

I. INTRODUCTION

Plaintiffs NXP USA, Inc. and NXP B.V. (collectively, "NXP") brought this patent-infringement action against Defendant Impinj, Inc., alleging infringement of a group of patents relating to radio frequency identification ("RFID") technology. The parties have asked the Court to construe certain claim terms within those patents. The Court hereby enters this order.

II.

BACKGROUND

A. Technology Background

RFID is a type of contactless wireless communication that uses electromagnetic frequencies to transmit identification information. *See generally* Dkt. # 220 (technology tutorial). RFID systems are used, for example, in retail stores for tracking merchandise and in warehouses for tracking inventory. *Id.* at 6. They are even used in U.S. passports and in various medical technologies. *Id.* RFID systems typically include a "data carrier" (or "tag"), which can attach to an object, and a "communication station" (or "reader"), which receives information from the data carrier through radio waves. The data carrier wirelessly transmits data to the communication station, which the reader uses to identify the object. *Id.* at 7. The data carrier often contains circuitry and a transmission means like an antenna. *Id.* at 8. Data carriers also typically have some form of memory that stores information. *Id.* And while some data carriers rely on a battery or other independence source for power, other tags are powered exclusively by the radio waves transmitted from the communication station. *Id.* at 9.

B. The Patents

NXP alleged in its complaint that Impinj infringed eight patents related to RFID technology. *See* Dkt. # 1. The parties later narrowed their dispute to six patents. *See* Dkt. # 176 at 2 & n.1.

The parties refer to three of these patents as the "wafer patents." The three wafer patents are United States Patent Numbers 7,456,489 ("the '489 Patent"), 7,538,444 ("the '444 Patent") and 8,415,769 ("the '769 Patent"). These patents are directed to semiconductor "wafers" on which integrated circuits are formed.

The parties refer to the remaining three patents as the "circuit patents." The three circuit patents are United States Patent Numbers 7,257,092 ("the '092 Patent"), 7,347,097 ("the '097 Patent"), and 7,795,951 ("the '951 Patent"). These patents are generally directed to components or elements within the integrated circuits themselves.

In accordance with Local Patent Rule 132(c), the parties submitted a list of ten terms for claim construction. Dkt. # 128. Impinj later moved for leave to brief five additional claim terms. Dkt. # 146. The Court granted that motion in part, providing leave to brief three additional claim terms. Dkt. # 186. These 13 terms for construction appear in the three circuit patents (the '092 Patent, '097 Patent, and '951 Patent) and one wafer patent (the '769 Patent).

But of the 13 terms identified and briefed by the parties, only 9 are still at issue. First, the Court granted Impinj's motion for partial summary judgment as to the three wafer patents (the '489 Patent, the '444 Patent, and the '769 Patent). *See* Dkt. # 87 (Impinj's partial summary judgment motion); Dkt. # 242 (sealed order granting the motion). Therefore, the Court need not construe any terms from the wafer patents, including the three terms identified in the '769 Patent.

Second, the parties have informed the Court that one term relating to the '092 Patent—"processing means (10, 11) for processing specific useful data (n×UDB)"—is no longer in dispute. Impinj's supplemental brief states that "Impinj hereby agrees to adopt NXP's proposed construction" and that "this term is no longer in dispute." *See* Dkt. # 191 at 12.

Therefore, the Court must construe nine terms that appear in the '092 Patent, the '097 Patent, and the '951 Patent.

1. The '092 Patent

The '092 patent describes techniques for communicating between a "communication station" and a "data carrier." '092 Patent at 1:5–8. Prior art methods used a two-step process for

communication between the data carrier and the communication station. The communication station would first conduct an "inventorization procedure" during which the communication station would identify all the data carriers within its range. *Id.* at 1:10–38. After the inventorization procedure, the data carrier would transmit "useful data" to the communication station upon request. *Id.* at 1:38–47. The "disadvantage" of this two-step method was that "it [took] a relatively long time" for the "useful data" to become usable by the communication station. *Id.* at 1:42–44.

The '092 Patent claims to improve upon the prior art by using an inventorization procedure in which the "identification data block" and the "useful data" are transmitted simultaneously. *Id.* at 11:7–17 ("[T]he invention is distinguished in that not only are parts of the identification data blocks IDB transmitted into the communication station 1 in the course of carrying out an inventorization procedure, but that during the inventorization procedure the specific useful data n×UDB desired and/or required in the communication station 1 are also simultaneously transmitted."); Dkt. # 135 at 14. This simultaneous transmission shortens the time it takes for the communication station to obtain the "useful data" stored in the data carriers. '092 Patent, 3:51–59.

2. The '097 Patent

Many data carriers contain storage systems used to store information temporarily. These carriers can, for example, temporarily store an indication of successful communication with a communication station. Dkt. # 137 at 21. The information is stored and represented "by a value of an information voltage that arises at the capacitor." '097 Patent, 1:45–47. The '097 Patent identifies a problem in the prior art: The information voltage would continuously decline due to "unavoidable leakage currents in the circuit." *Id.* at 1:62–2:1. This decline in voltage would

lead to an "unsatisfactory situation" because the information was "no longer able to be evaluated after only a short period of time." *Id.* at 2:2–7.

The '097 Patent describes an invention that purports to solve this problem. The invention described by the '097 Patent provides "a substantially longer period of time during which the stored information can be ascertained with high reliability." *Id.* at 2:34–36. This also allows the information to remain accessible if a brief supply-voltage failure occurs. *Id.* at 2:35–42. The patent achieves this in part by adding a "voltage-raising means" to the "information-voltage generating means." *Id.* at 2:13–23; *see also* Dkt. # 135 at 17.

The specification describes the invention in more detail. It states that the carrier first receives a wireless signal, which is used to form a supply voltage. '097 Patent, 3:27–35. The circuit produces a "control signal CS" that is "at most equal to the value of the supply voltage." *Id.* at 3:62–63. The circuit contains "information-voltage generating means" that receive the control signal CS and uses the control signal CS to produce an "information voltage UI." *Id.* at 3:63–66. The information-voltage generating means further consist of "voltage-raising means," "voltage-limiting means," and a "charging-current generating stage." *Id.* at 4:15–29.

3. The '951 Patent

Some circuits found within RFID tags operate with relatively little power because they receive power only through the wireless signal transmitted to them (known as the "supply voltage"). *See* Dkt. # 220 at 13. Some of the circuit components, however, benefit from higher voltages, while others benefit from lower voltages. *Id.*; '951 Patent, 1:10–24. Therefore, many circuits contain "voltage multiplier circuits" to modify the voltage. Dkt. # 220 at 13. The purpose of the voltage multiplier is to increase or decrease a supply voltage to a desired level. Dkt. # 149 at 13.

The '951 Patent describes a particular voltage multiplier circuit that "advantageously" enables multiplication of the voltage to a range of different voltages, including voltages both above and below the supply voltage. '951 Patent, 1:11–24, 1:49–63. The invention "control[s]" the generated voltage amplitude, producing a "regulated" voltage as it moves through the circuit components. *Id.* at 2:2–6.

As described in the specification, the voltage multiplier identified in the '951 Patent has two or more "multiplier stages." *Id.* at 2:16–17. The voltage multiplier also includes a "feedback bias control circuit" that is coupled to receive the output of the voltage multiplier stages. *Id.* at 4:17–44, 6:1–33, Abstract. The feedback bias control circuit helps control or regulate the actions of the voltage multiplier by providing a "feedback bias control signal," which is then fed to "regulated clocks" and to an "input level regulator." *Id.* at 3:60–61 ("regulated clock" with "an input for receiving a feedback bias control signal"), 3:23 ("input level regulator" with "a feedback bias control input"). The regulated clocks then provide a signal to each multiplier stage. *Id.* at 2:40–43, 3:46–55, 3:59–4:1. The input level regulator outputs a signal to the first multiplier stage. *Id.* at 3:22–32. The input level regulator "advantageously enables regulation of a voltage to a range of voltage levels" including voltages equal to or lower than the supply voltage. *Id.* at 3:24–28.

C. Procedural History

The parties filed initial claim construction briefs in September 2021. Dkt. ## 135, 149 (Impinj's briefs); Dkt. ## 137, 150 (NXP's briefs). This case was reassigned to the undersigned judge in May 2022. Dkt. # 175. The parties filed supplemental claim construction briefs during the summer of 2022 addressing three additional terms in the '092 Patent.[1] Dkt. # 191 (Impinj's

[1] As discussed above, the parties no longer dispute one of the terms in the '092 Patent.

supplemental brief); Dkt. # 195 (NXP's supplemental brief). The parties argued their proposed claim constructions at a *Markman* hearing on October 4, 2022. Dkt. # 237. On October 20, 2022, the Court granted Impinj's motion for partial summary judgment as to the three wafer patents, eliminating the need for construction of three terms in the '769 Patent. *See* Dkt. # 87 (Impinj's partial summary judgment motion); Dkt. # 242 (sealed order granting the motion).

III.

LEGAL PRINCIPLES

A. General Claim Construction Principles

"It is a 'bedrock principle' of patent law that 'the claims of a patent define the invention to which the patentee is entitled the right to exclude.'" *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc) (quoting *Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1115 (Fed. Cir. 2004)); *see also Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996) ("[W]e look to the words of the claims themselves . . . to define the scope of the patented invention.").

When construing a patent claim, the words of the claim "are generally given their ordinary and customary meaning." *Phillips*, 415 F.3d at 1312 (quoting *Vitronics*, 90 F.3d at 1582). The "ordinary and customary meaning" of a term is the meaning of the words as understood by a person of ordinary skill in the art ("POSITA") at the time of the invention. *Id.* at 1313. Although words in a claim are generally given their ordinary meaning, the Federal Circuit has recognized "two exceptions to this general rule: 1) when a patentee sets out a definition and acts as his own lexicographer, or 2) when the patentee disavows the full scope of a claim term either in the specification or during prosecution." *Thorner v. Sony Comput. Ent. Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012). For the patentee's unique definition to govern, the patentee must "clearly set forth a definition of the disputed claim term other than its plain and ordinary

meaning. *Id.* (internal quotation marks and citation omitted). The "standard for disavowal of claim scope is similarly exacting." *Id.* at 1366. "Absent a clear disavowal in the specification or the prosecution history, the patentee is entitled to the full scope of its claim language." *Home Diagnostics, Inc. v. LifeScan, Inc.*, 381 F.3d 1352, 1358 (Fed.Cir.2004).

To determine the meaning of a disputed term, courts mainly rely on "intrinsic" evidence: the claim language, the written description in the specification, and the patent's prosecution history. *Phillips*, 415 F.3d at 1311–17. A court's analysis begins with the language in the claims. *See id.* at 1314; *Innova/Pure Water*, 381 F.3d at 1116 ("[C]laim construction analysis must begin and remain centered on the claim language itself."). But claim terms are not to be read in a vacuum. Rather, claims "are part of a fully integrated written instrument . . . consisting principally of a specification that concludes with the claims." *Phillips*, 415 F.3d at 1315 (citation and internal quotation marks omitted); *see also id.* at 1313. The specification is particularly important to claim construction and is often "the single best guide to the meaning of a disputed term." *Id.* at 1315 (quoting *Vitronics*, 90 F.3d at 1582). This is because the specification "aids in ascertaining the scope and meaning of the claims." *Id.* (quoting *Standard Oil Co. v. Am. Cyanamid Co.*, 774 F.2d 448, 452 (Fed. Cir. 1985)). Thus, courts "rely heavily" on the specification. *Id.* at 1317.

Courts often struggle when using the specification to guide the claim construction inquiry. *Id.* at 1323. On the one hand, courts rely on the specification to help determine the meaning of a disputed term. *Id.* On the other hand, the Federal Circuit has repeatedly warned that a court may not read limitations from the specification into the claim. *Id.*; *see also Laitram Corp. v. NEC Corp.*, 163 F.3d 1342, 1347 (Fed. Cir. 1998) (noting that it is a "well-established principle that a court may not import limitations from the written description into the claims"); *SciMed Life Sys., Inc. v. Advanced Cardiovascular Sys., Inc.*, 242 F.3d 1337, 1340 (Fed. Cir.

2001) (observing that one of the "cardinal sins of patent law" is "reading a limitation from the written description into the claims"). The "distinction between using the specification to interpret the meaning of a claim and importing limitations from the specification into the claim can be a difficult one to apply in practice." *Phillips*, 415 F.3d at 1323. But the Federal Circuit has explained that "the line between construing terms and importing limitations can be discerned with reasonable certainty and predictability if the court's focus remains on understanding how a person of ordinary skill in the art would understand the claim terms." *Id.*

In addition to considering intrinsic evidence (like the claim language and specification), courts may also rely on "extrinsic" evidence. Extrinsic evidence "consists of all evidence external to the patent and prosecution history, including expert and inventor testimony, dictionaries, and learned treatises." *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 980 (Fed. Cir. 1995), *aff'd*, 517 U.S. 370, (1996) (citation omitted). While extrinsic evidence may be useful, it is generally given less weight than intrinsic evidence. *Phillips*, 415 F.3d at 1317.

The construction of a patent's claims is a question of law to be decided by the court. *Teva Pharmaceuticals USA, Inc. v. Sandoz, Inc.*, 574 U.S. 318, 321 (2015); *Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 390 (1996).

B. Principles for Means-Plus-Function Claims

Under 35 U.S.C.§ 112, ¶ 6 (now codified at 35 U.S.C. § 112(f)),[2] claims may be drafted in a "means-plus-function" format in which the claim "recites a function to be performed rather than definite structure or materials for performing that function." *Lockheed Martin Corp. v.*

[2] The America Invents Act ("AIA") amended and reorganized section 112, moving 35 U.S.C. 112, ¶ 6 to 35 U.S.C. § 112(f). But the AIA did not substantively change the means-plus-function portion of the statute. Because the patents at issue were filed before the AIA took effect, this order refers to the pre-AIA version of Section 112. *See Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1343 n.2 (Fed. Cir. 2015) (en banc).

Space Sys./Loral, Inc., 324 F.3d 1308, 1318 (Fed. Cir. 2003) (citing 35 U.S.C. § 112, ¶ 6). By allowing inventors to draft claims in this manner,

> Congress struck a balance in allowing patentees to express a claim limitation by reciting a function to be performed rather than by reciting structure for performing that function, while placing specific constraints on how such a limitation is to be construed, namely, by restricting the scope of coverage to only the structure, materials, or acts described in the specification as corresponding to the claimed function and equivalents thereof.

Williamson v. Citrix Online, LLC, 792 F.3d 1339, 1347 (Fed. Cir. 2015) (en banc).

Interpreting a means-plus-function limitation is a multi-step process. A court must first determine whether the term is drafted in a means-plus-function format such that § 112, ¶ 6 applies. *MTD Prod. Inc. v. Iancu*, 933 F.3d 1336, 1344 (Fed. Cir. 2019); *Williamson*, 792 F.3d at 1348. The presence of the word "means" in a claim creates a rebuttable presumption that the claim is governed by § 112, ¶ 6. *See Egenera, Inc. v. Cisco Sys., Inc.*, 972 F.3d 1367, 1372 (Fed. Cir. 2020) ("We presume that claim terms with the word 'means' invoke § 112(f)"); *Williamson*, 792 F.3d at 1348. But courts must not reflexively "evaluate[] form over substance when evaluating whether a claim limitation invokes § 112, para. 6." *Williamson*, 792 F.3d at 1348. The Federal Circuit has explained:

> In making the assessment of whether the limitation in question is a means-plus-function term subject to the strictures of § 112, para. 6, our cases have emphasized that the essential inquiry is not merely the presence or absence of the word "means" but whether the words of the claim are understood by persons of ordinary skill in the art to have a sufficiently definite meaning as the name for structure.

Id. (citation omitted); *see also MTD Prods.*, 933 F.3d at 1344 ("As part of this step, we consider whether the claim limitation connotes 'sufficiently definite structure' to a person of ordinary skill in the art."). "To determine whether a claim recites sufficient structure, it is sufficient if the claim term is used in common parlance or by persons of skill in the pertinent art to designate structure, even if the term covers a broad class of structures and even if the term identifies the

structures by their function." *Skky, Inc. v. MindGeek, s.a.r.l.*, 859 F.3d 1014, 1019 (Fed. Cir. 2017) (citation and quotation marks omitted); *see also MTD Prods.*, 933 F.3d at 1344; *Dyfan, LLC v. Target Corp.*, 28 F.4th 1360, 1365–66 (Fed. Cir. 2022).

Once a court has determined that § 112, ¶ 6 applies, the court must "identify the claimed function." *Williamson*, 792 F.3d at 1351. And once a court has identified the claimed function, the court "must determine what structure, if any, disclosed in the specification corresponds to the claimed function." *Id.*; *see also MTD Prods.*, 933 F.3d at 1344. This is necessary because a means-plus-function claim subject § 112, ¶ 6 covers only the corresponding structure(s) disclosed in the specification along with any equivalents thereof.

"Structure disclosed in the specification qualifies as 'corresponding structure' if the intrinsic evidence *clearly links or associates* that structure to the function recited in the claim." *Williamson*, 792 F.3d at 1352 (emphasis added) (citation omitted). "Even if the specification discloses corresponding structure, the disclosure must be of 'adequate' corresponding structure to achieve the claimed function." *Id.* (citation omitted). "The inquiry is whether one of skill in the art would understand the specification itself to disclose a structure, not simply whether that person would be capable of implementing a structure." *Biomedino, LLC v. Waters Techs. Corp.*, 490 F.3d 946, 951 (Fed. Cir. 2007).

But "[i]f the patentee fails to disclose adequate corresponding structure, the claim is indefinite," and is therefore invalid. *Williamson*, 792 F.3d at 1352. When "a person of ordinary skill in the art would be unable to recognize the structure in the specification and associate it with the corresponding function in the claim, a means-plus-function clause is indefinite." *Id.*; *see also Atmel Corp. v. Info. Storage Devices*, 198 F.3d 1374, 1382 (Fed. Cir. 1999) (The structure "must be disclosed in the written description in such a manner that one skilled in the art will know and understand what structure corresponds to the means limitation."). If the patentee

"fails to set forth an adequate disclosure, the applicant has in effect failed to particularly point out and distinctly claim the invention as required by [the statute]." *Noah Sys., Inc. v. Intuit Inc.*, 675 F.3d 1302, 1311–12 (Fed. Cir. 2012) (citation omitted). This renders the term indefinite. *Id.*

IV.

DISCUSSION

A. The '092 Patent

1. "characteristic identification data block (IDB)"

The '092 Patent describes an RFID system in which identification data and "useful data" are simultaneously transmitted from the data carrier to the communication station. The patent describes the identification data stored within the data carrier as the "characteristic identification data block (IDB)." For example, claim 1 of the '092 Patent discusses a "data carrier" that "comprises a characteristic identification block (IDB)." '092 Patent, 17:48–55. The term is used in the same manner in independent claims 1, 6, 7, 11, 15, and 19, as well as several dependent claims. The parties dispute the meaning of the term "characteristic identification data block (IDB)."

Impinj construes the term to mean "a serial number." Dkt. # 135 at 14. This, Impinj says, is because the specification defines the term "characteristic identification data block (IDB)" as a "serial number." *See Phillips*, 415 F.3d at 1321 ("[T]he specification acts as a dictionary when it expressly defines terms used in the claims or when it defines terms by implication." (internal quotation marks and citation omitted)); *id.* at 1316 ("[T]he specification may reveal a special definition given to a claim term by the patentee that differs from the meaning it would otherwise possess. In such cases, the inventor's lexicography governs.").

NXP construes the term to mean "identification data stored in memory," or otherwise asks the Court to construe the term according to its plain and ordinary meaning. Dkt. # 137 at

18. NXP argues that the term refers to any identification data stored in memory, whether that data take the form of a serial number or something else. *Id.* at 18–19. NXP responds to Impinj's construction by observing that when the specification uses the term "serial number," it does so only to provide an example; the use of "serial number" in the specification was not intended to limit the scope of the claim term. *Id.* at 19.

The Court agrees with NXP and adopts the construction of "identification data stored in memory." Neither the claim terms nor the specification limit "identification data block" to any particular format like a serial number. When broken down, the term refers to (1) a block (2) of data (3) used for identification, without limiting the format of that data block. This is the "ordinary and customary meaning" of the words to a POSITA.

Impinj responds that the specification "defines" "identification data block" as a serial number. Dkt. # 135 at 14–15. As evidence, Impinj points to a portion of the specification that describes prior art in which

> the first step is to carry out an inventorization procedure, which usually consists of a plurality of procedure runs and in which so many procedure runs are carried out until the identification data blocks stored in the data carriers, *also denoted serial numbers*, of all data carriers present in a communication region of the communication station are known in the communication station.

'092 Patent, 1:22–29 (emphasis added). Impinj says that the patentee defined "identification data block" as "a serial number" because the term "serial number" is preceded by the word "denote," which is often used to designate meaning or definition. Dkt. # 135 at 15 n.6.

To be sure, an inventor may "act[ ] as his own lexicographer" by clearly setting forth in the specification a different definition of the claim term in question. *Thorner*, 669 F.3d at 1365. When the inventor provides a "special definition" for a given claim term, "the inventor's lexicography governs." *Phillips*, 415 F.3d at 1316.

But "a claim term is only given a special definition different from the term's plain and ordinary meaning if the 'patentee . . . clearly set[s] forth a definition of the disputed claim term other than its plain and ordinary meaning.'" *Akamai Techs., Inc. v. Limelight Networks, Inc.*, 805 F.3d 1368, 1375 (Fed. Cir. 2015) (alterations in original) (quoting *Thorner*, 669 F.3d at 1365). While a definition provided in a specification need not be "express" or "explicit" to control the scope of the term, it must still be clear. *See Phillips*, 415 F.3d at 1321. The patentee must "clearly express an intent to redefine the term." *Thorner*, 669 F.3d at 1365 (internal quotation marks and citation omitted).

The language to which Impinj points is anything but a "clear[]" statement sufficient to redefine the term. *Akamai*, 805 F.3d at 1375 (citation omitted). The patent references "serial number" twice. "Identification data block" appears more than 130 times in the specification alone. Dkt. # 244 at 52. It would be odd to focus on the two "serial number" references to conclude that the patentee intended to restrict the scope of the disputed term.

This is particularly true when it is unclear whether the patent's use of the word "denoted" was meant to redefine the term "identification data block." Even ignoring the awkward phrasing of the passage, "denote" does not necessarily create an exclusive definition. Using the same dictionary cited by Impinj, the word also means "to serve as an indication of," suggesting that "serial number" could be an example of (or indicative of) the identification data block. "Denote," *Merriam-Webster Dictionary*, https://www.merriam-webster.com/dictionary/denote. Moreover, NXP observes that the'092 Patent tends to use "i.e." as a signal when defining a term. *See, e.g.*, '092 Patent, 1:32–33 ("inventorized, i.e. identified"). The Federal Circuit has declined to find a statement to be "definitional" when it did not "accord with the linguistic formula used by the patentee to signal" other definitions. *Med. Co. v. Mylan, Inc.*, 853 F.3d 1296, 1306 (Fed. Cir. 2017).

Perhaps more importantly, Impinj's proposed construction would conflict with other portions of the specification. First, the other instance of the term "serial number" in the patent undermines Impinj's construction. The specification describes an embodiment in which communication occurs using "the first four (4) bits of its identification data block IDB, thus by its serial number." '092 Patent, 11:60–61. A plausible reading of this passage suggests that in this embodiment, the patentee thought of the serial number as only the first four bits of the identification data block, not the entire thing. And "where claims can reasonably [be] interpreted to include a specific embodiment, it is incorrect to construe the claims to exclude that embodiment, absent probative evidence on the contrary." *GE Lighting Sols., LLC v. AgiLight, Inc.*, 750 F.3d 1304, 1311 (Fed. Cir. 2014) (citation omitted).

Second, the patent discloses an embodiment in which "special data" that is "useful or absolutely necessary for other applications" may be included within the identification data block. '092 Patent, 17:10–18. To be sure, the patent does not explain the meaning of "special data." But this embodiment would suggest to a POSITA that the phrase "identification data block" encompasses identification data that may be broader than a mere serial number. *See GE Lighting*, 750 F.3d at 1311.

Third, NXP points to industry materials that use a similar term—"Unique identifier (UID)"—to include more than a serial number. The ISO/IEC15693-3 standard discloses a 64-bit "Unique identifier (UID)" that encompasses a 48-bit "serial number," an 8-bit manufacturer code, and 8 bits of other data. Dkt. # 137 at 19. A POSITA that is familiar with this industry standard would thus understand the similar term "identification data block" to refer to a broader class of data than just a "serial number."

Impinj's proposed construction would impermissibly import limitations from the specification into the claims. *See SciMed*, 242 F.3d at 1340. And because the patentee did not

clearly re-define the term "characteristic identification data block (IDB)" to mean "a serial number," the patentee is entitled to the full scope of the term's ordinary meaning. Accordingly, the Court construes the term "characteristic identification data block (IDB)" as "identification data stored in memory."

2. "specific useful data (n×UDB)"

Claim 1 of the '092 Patent describes a communication method by which "specific useful data (n×UDB)" is transmitted from a data carrier to a communication station. *See, e.g.*, '092 Patent, 17:56–59. The term appears in nearly every claim and is used in the same way as in claim 1. The parties dispute the term's meaning.

As an initial matter, the parties agree that "specific useful data (n×UDB)" refers to a subset of all available "useful data." *See* Dkt. ## 137 at 20–21; 135 at 15; *see also* '092 Patent at 10:13–19. As Impinj states, "[t]he parties agree that the term means something less than all useful data ('some' or a 'portion of')." Dkt. # 135 at 15. But the parties dispute whether the term refers to any subset of useful data or whether the term is limited to a particular subset of useful data. NXP argues that the term refers to any subset of useful data and proposes a construction of "some, but not all, useful data (UD)." Dkt. # 137 at 20. Impinj argues that the term is limited to a particular subset of useful data. Dkt. # 135 at 15. In particular, Impinj construes the term to mean "a portion of useful data (UD), where the portion is specified in a request from the communication station that indicates a useful data start block and a specific number n of useful data blocks." *Id.* The Court adopts NXP's proposed construction and construes the term "specific useful data (n×UDB)" to mean "some, but not all, useful data (UD)." *Id.*

To start, nothing in the claim language suggests an intent to limit "specific useful data (n×UDB)" to that which has been requested by the communication station. *See Williamson*, 792

F.3d at 1346 ("[I]t is the *claims,* not the written description, which define the scope of the patent right." (internal quotation marks and citation omitted)).

The Court next considers the specification to guide its construction of the term. *Phillips*, 415 F.3d at 1315 (noting that "the specification 'is always highly relevant to the claim construction analysis'" (quoting *Vitronics*, 90 F.3d at 1582)). The specification discloses at least two embodiments relevant to the construction of this term. First, the specification primarily focuses on an embodiment in which a data carrier transmits specific useful data n×UDB in response to a "request" from the communication station. *See, e.g.*, '092 Patent, 16:22–28. Second, the specification discloses—albeit in a more cursory fashion—an embodiment[3] in which a data carrier "automatically" transmits "a specific selection of useful data blocks." *Id.* at 16:22–34. As to that second embodiment, the specification teaches that "it is also possible to select a design in which no request for useful data is made by the communication station 1, but in which . . . *automatically a specific selection of useful data blocks UDB are transmitted* from each data carrier 2 (DC) to the communication station 1." '092 Patent at 16:22–34 (emphasis added). Impinj's proposed construction—which limits the term to specific useful data transmitted in response to a *request*—would improperly exclude this second, "automatic" embodiment. *See GE Lighting*, 750 F.3d at 1311 ("[W]here claims can reasonably [be] interpreted to include a specific embodiment, it is incorrect to construe the claims to exclude that embodiment, absent probative evidence on the contrary." (citation omitted)).

Impinj's main argument focuses on the parenthetical "(n×UDB)," which follows each instance of the phrase "specific useful data" within the claims. *See* Dkt. ## 135 at 15–16; 149 at

[3] At the *Markman* hearing, the parties agreed that the '092 Patent's discussion of automatically transmitted specific data constitutes an "embodiment" despite its cursory treatment in the specification. Dkt. # 244 at 66, 69.

9. Impinj argues that NXP's proposed construction reads the parenthetical out of the claim language, violating the principle that "[a] claim construction that gives meaning to all the terms of the claim is preferred over one that does not do so." *Merck & Co. v. Teva Pharms. USA, Inc.*, 395 F.3d 1364, 1372 (Fed. Cir. 2005). According to Impinj, the specification defines "n×UDB" in a manner more consistent with its construction:

> The *useful data start block included in a request data block* RDB and the *number n* of useful data blocks are detected by the block detection means 38, the result being that the block detection means 38 ensure that, beginning with the determined start block, *a total of n useful data blocks UDB, i.e. n×UDB are read out as specific useful data* . . . .

'092 Patent at 10:9–15 (emphasis added); Dkt. # 135 at 16. Impinj argues that "n×UDB"—"defined" using the phrase "i.e."[4] in a paragraph that discusses transmission based on a request—refers to specific useful data transmitted in response to a request, not specific useful data that is automatically transmitted. Moreover, Impinj notes that when the specification discusses automatic transmission of data, it omits the term "n×UDB." *See* '092 Patent, 16:28–33 ("[I]t is also possible to select a design in which no request for useful data is made by the communication station 1, but in which . . . automatically *a specific selection of useful data blocks UDB* are transmitted from each data carrier." (emphasis added)). According to Impinj, this suggests that the inclusion of "(n×UDB)" in the claims refers only to specific useful data transmitted in response to a request.

But Impinj's argument does not persuade the Court. First, it is unclear whether the patent defines "n×UDB" to refer only to requested data. While the phrase "i.e. n×UDB" appears in a sentence that otherwise discusses data transmitted in response to a request, it does not necessarily follow that "i.e. n×UDB" refers only to requested data. The pertinent portion of the sentence

[4] NXP's brief expressly states (though in the context of a different term) that the '092 Patent uses "i.e." to introduce a definition. Dkt. # 150 at 11.

states: ". . . a total of n useful data blocks UDB, i.e. n×UDB are read out as specific useful data . . . ." '092 Patent, 10:13–15. The most natural reading of the clause beginning with "i.e. n×UDB" is that it modifies the immediately antecedent phrase, "a total of n useful data blocks UDB." Read in this way, "n×UDB" simply refers to a number (n) of "useful data blocks" (UDB), whether or not the "n" number of data blocks are transmitted automatically or in response to a request.

Second, "n×UDB" is used inconsistently throughout the '092 Patent. While the term often accompanies the words "specific useful data" in the specification, it does not always do so.[5] For example, while one sentence in the specification describes a method by which "transmission of specific useful data is carried out from the at least one data carrier," '092 Patent, 1:67–2:1 (lacking reference to "n×UDB"), another nearly identical sentence in the specification includes "n×UDB," stating that "the specific useful data (n×UDB) are transmitted from the at least one data carrier," *id*. at 3:66–4:1. The parenthetical is even used inconsistently within a single paragraph that indisputably refers to the same "specific useful data." *Id.* at 4:18–30 (explaining that it is advantageous for the "specific useful data (n×UDB) [to be] transmitted in time after the data (NKP IDB) from the identification data block," but later stating that "it is also possible for the specific useful data to be transmitted . . . before the data from the identification data block.")

The Court can discern no logic for the sporadic inclusion or omission of the parenthetical. Given this inconsistent drafting, Impinj's observation that the specification does not use "n×UDB" when describing automatic data transmission does not carry much explanatory power. The Court is skeptical that a POSITA reading the patent would place so much weight on the

[5] While the term "n×UDB" appears inconsistently throughout the specification, the claims consistently use the parenthetical "(n×UDB)" after every use of the words "specific useful data."

presence or absence of the parenthetical; a POSITA is more likely to think that "specific useful data" refers to the same thing throughout the patent, whether or not it is succeeded by the "(n×UDB)" parenthetical. And because neither the claim language nor the specification limit "specific useful data" to any particular subset of data, the Court construes the term "specific useful data (n×UDB)" to mean "some, but not all, useful data (UD)."

3. "output means (40, 34, 32, 25) for outputting to the communication station (1) specific useful data (n×UDB)"

Claim 15 of the '092 Patent describes a data carrier that contains "output means (40, 34, 32, 25) for outputting to the communication station (1) specific useful data (n×UDB)." '092 Patent, 20:2–5. The reference numbers in parentheses—40, 34, 32, and 25—refer to elements described in the specification. At various points, the specification describes "processing means 40," "coding means 34," "modulation means 32," and "transmission means 25." Dkt. # 195 at 8, 10–11.

The parties agree that the term "output means (40, 34, 32, 25) for outputting to the communication station (1) specific useful data (n×UDB)" is a means-plus-function limitation subject to § 112, ¶ 6. Dkt. ## 191 at 7; 195 at 10. The parties also agree the claimed function is "outputting to the communication station specific useful data (n×UDB)." Dkt. ## 191 at 7; 195 at 10.

The parties dispute, however, the corresponding structure. NXP says that the corresponding structure is "processing means 40, coding means 34, modulation means 32, transmission means 25, and equivalents." Dkt. # 195 at 10. NXP argues that the four parenthetical reference numbers—40, 34, 32, and 25—guide the patent reader to the four corresponding components in the specification bearing those same reference numbers, "clearly link[ing]" the outputting function with those four components. *Williamson*, 792 F.3d at 1352.

Impinj argues that it is improper for the Court to consider the reference numbers when construing the claim. Dkt. # 191 at 6–7. But if the Court does consider the reference numbers, Impinj argues that the patent discloses no corresponding structure for "output means" and that the claim therefore invalid for indefiniteness.[6] *Id.* at 9–11. In the alternative, Impinj says that the corresponding structure for "output means . . ." is an "antenna element" and its equivalents. *Id.* at 8.

A claim that employs a means-plus-function form must disclose adequate "corresponding structure" in the specification; if it does not, it is invalid as indefinite. *Williamson*, 792 F.3d at 1352. "Structure disclosed in the specification qualifies as 'corresponding structure' if the intrinsic evidence clearly links or associates that structure to the function recited in the claim." *Id.* (citation omitted). "Even if the specification discloses corresponding structure, the disclosure must be of 'adequate' corresponding structure to achieve the claimed function." *Id.* (citation omitted). "The inquiry is whether one of skill in the art would understand the specification itself to disclose a structure, not simply whether that person would be capable of implementing a structure." *Biomedino*, 490 F.3d at 951.

The parties first dispute the role that reference numbers play in claim construction. This issue is dispositive of this term. If the Court gives the reference numbers no weight, then construction of this term is straightforward: The four reference numbers serve as the only reasonably specific clues about what corresponding structures fulfill the outputting function. The specification discusses "output means" only twice. Neither use of the term conveys anything close to corresponding structure; each instance discusses "output means" in purely

[6] Impinj's brief seems to focus only on the lack of structure disclosed for "modulation means" and "coding means," and does not focus on "transmission means" or "processing means." *See* Dkt. # 191 at 9–11.

functional terms. '092 Patent, 3:5, 3:31. Nor does the specification "clearly link[]" any other corresponding structure to the outputting function. *Williamson*, 792 F.3d at 1352.

Addressing this apparent question of first impression, the Court concludes that the reference numbers in the claim cannot alone indicate "corresponding structure" for this means-plus-function claim. The general rule is that reference numbers used in the claims of a patent carry no meaning; they do not limit or alter the scope of the term in any way. The Manual of Patent Examination and Procedure states that "[g]enerally, the presence or absence of such reference characters does not affect the scope of a claim." *See Manual of Patent Examination and Procedure* ("MPEP"), § 608.01(m) (9th ed., 2019).

And while the Federal Circuit does not appear to have addressed the question,[7] district courts have come to the same conclusion. *See Core Wireless Licensing S.A.R.L. v. LG Elecs., Inc.*, No. 2:14-CV-0911-JRG-RSP, 2015 WL 6956722, at *7 (E.D. Tex. Nov. 9, 2015) ("Courts that have considered the implications of the use of reference numbers in a claim have followed the general rule that reference numbers do not limit the claims."); *id.* ("[T]he rationale for excluding such numbers is equally applicable to means-plus-function terms."); *Millipore Corp. v. W.L. Gore Assocs., Inc.*, No. CIV.A. 11-1453 ES, 2012 WL 5250386, at *4 (D.N.J. Oct. 24, 2012) ("[T]he parties agree that the reference characters have no special effect on claim scope."); *KEG Kanalreinigungstechnick GmbH v. Laimer*, No. 1:11-CV-1948-JEC, 2013 WL 8719444, at *30 (N.D. Ga. Jan. 11, 2013*), report and recommendation adopted*, No. 1:11-CV-1948-JEC, 2013 WL 11904722 (N.D. Ga. Feb. 21, 2013) (observing that the MPEP "provides that reference

[7] NXP cites several cases in which the Federal Circuit relied on reference numbers to determine claim meaning. *See Ironworks Patents LLC v. Samsung Elecs. Co*, 798 Fed. App'x 621, 625–26 (Fed. Cir. 2020); *Superior Fireplace Co. v. Majestic Prods. Co.,* 270 F.3d 1358, 1374 (Fed. Cir. 2001); Dkt. # 195 at 6–7. But those cases involved reference numbers in the written description; neither involved reference numbers in the claims themselves.

numerals *may*, as an option, be used in claims, but doing so has *no effect on the scope of the claims*" (second emphasis added)); *Relume Corp. v. Dialight Corp. et al*., 63 F. Supp. 2d 788, 796, n.6 (E.D. Mich. 1999) ("A reference numeral is simply a convenient tool for directing the reader to an example of the element the patentee has claimed. Had the drafter wanted to incorporate the limitations of the preferred embodiment into the language of claim 1, he or she could have done so quite easily with words.").

NXP does not dispute this general rule. NXP instead argues that the reference numbers in the claim at issue are not used to limit the claim or alter the claim scope. Dkt. # 195 at 6–7. In the context of this means-plus-function claim, NXP says, the reference numbers merely guide the reader to structures in the specification that qualify as corresponding structure; they do not otherwise alter the scope of the term itself.

The Court recognizes that NXP presents a plausible argument. Means-plus-function claims are unique in patent law: While most of patent law forbids the importation of limitations from the specification into the claims, *see SciMed*, 242 F.3d at 1340, means-plus-function claims require the court to look to the specification to determine the metes and bounds of the claim. A means-plus-function claim is limited to the corresponding structure disclosed in the specification, requiring a degree of interaction between the claims and the specification. This might justify an exception to the general rule, allowing the patentee to conveniently refer back to the specification and "clearly link[]" the claimed function to the corresponding structure using reference numbers.

But the Court concludes that patent law would appear to be better served by a bright-line rule: Reference numbers in claims do not affect the construction or scope of a claim. With a bright-line rule, patentees are on notice that they cannot rely on reference numbers to convey

substantive meaning in the claims, whether those reference numbers are found in a means-plus-function claim or not.

Carving out an exception to this general rule could create uncertainty and odd results. If reference numbers in claims affect construction of means-plus-function claims but not other claims, there would be two parallel sets of interpretative rules: one for means-plus-function claims, and another for all other claims. *Cf. MTD Prods.*, 933 F.3d at 1342 (applying the same interpretative canon—that claims must be interpreted in light of the written description—regardless of whether those claims are drafted in means-plus-function form). This dichotomy is particularly troublesome because it is often unclear whether a term *is*, in fact, a means-plus-function claim. A patentee may not know *ex ante*, then, whether their inclusion of reference numbers will be treated as entirely irrelevant or whether (as here) a court may one day interpret them to carry dispositive meaning.

Moreover, a bifurcated interpretative rule could complicate the corresponding-structure analysis. For example, it could be ambiguous whether the patentee intended for the list of reference numbers to be exhaustive of all other potential corresponding structure. Even the position of the reference numbers within a sentence could lead to interpretative challenges. Thus, patent law would appear to be best served by a bright-line rule that gives reference numbers in a claim no role in determining the substantive scope of the claim.

NXP argues that reliance on reference numbers to indicate corresponding structure is different than using reference numbers to "limit" the scope of the claim. Instead, NXP says, a reference number "is simply a convenient tool for directing the reader to an example of the element the patentee has claimed." *Relume*, 63 F. Supp. 2d at 796, n.6 (but ultimately concluding that the reference numbers play no role in a claim's scope). But when a court determines the corresponding structure of a means-plus-function claim, the court is essentially

"limiting" the claim term. The court takes what is otherwise a broad, indefinite claim drafted in functional form and limits it in some fashion based on the structure disclosed in the specification. *Cf. Aristocrat Techs. Australia Pty Ltd. v. Int'l Game Tech.*, 521 F.3d 1328, 1333 (Fed. Cir. 2008) ("The point of the [corresponding-structure] requirement that the patentee disclose particular structure in the specification and that the *scope of the patent claims be limited to that structure* and its equivalents is to avoid pure functional claiming." (emphasis added)); *Finisar Corp. v. DirecTV Grp., Inc.*, 523 F.3d 1323, 1340 (Fed. Cir. 2008) ("[M]eans-plus-function elements . . . are statutorily *limited* to the 'corresponding structure, material, or acts described in the specification and equivalents thereof.'" (emphasis added) (citing 35 U.S.C. § 112, ¶ 6)).

And in this case, the '092 Patent expressly states that reference numbers in the claims do not affect the scope of the claim. The specification states: "In the claims, *any reference signs placed in parentheses shall not be construed as limiting the claims*." '092 Patent, 7:39–41 (emphasis added). This statement strongly implies that the patentee did not intend for the reference numbers in the claims to carry any substantive weight.

The Court thus declines to rely exclusively on reference numbers in the claims to signal corresponding structure. And without resorting to the reference numbers, no structure is "clearly link[ed]" to the "output means" function. *Williamson*, 792 F.3d at 1352. As NXP's briefing concedes, an "antenna" alone does not suffice to carry out the outputting function. Dkt. # 195 at 13 ("[A]n antenna alone, as proposed by Impinj, is not capable of outputting any data at all, and cannot perform the claimed function."). Accordingly, the term is invalid for indefiniteness.

4. "output means (40, 34, 32) for outputting specific useful data (n×UDB), included in the data carrier circuit (28) after the specific useful data's (n×UDB) storage, to the communication station"

Claim 19 of the '092 Patent includes a term that is nearly identical to the term construed in claim 15 just above. Both are "output means" terms that attempt to designate structure by

relying on reference numbers. The only difference is that claim 19 contains a parenthetical with three reference numbers—"(40, 34, 32)"—whereas the parenthetical in claim 15 also includes reference number 25.

This term is indefinite for the same reasons discussed for the prior term. Because the Court declines to rely exclusively on reference numbers in a claim to indicate corresponding structure, this limitation is indefinite because the specification lacks corresponding structure.

B. The '097 Patent

1. "information-voltage generating means that are arranged to receive a control signal . . . and that are arranged to generate the information voltage by using the control signal"

The '097 Patent describes a data carrier that temporarily stores information capacitively. '097 Patent, 1:1–18. The information is represented by the value of an "information voltage," which is produced by "information-voltage generating means." *Id.* The specification describes an embodiment in which the "information-voltage generating means" receive a "control signal" and are further comprised of a charging-current generating stage, a voltage-raising means, and a voltage-limiting means. *Id.* at 3:60–4:14.

Claim 1 of the '097 Patent exemplifies the patent's use of the term. Claim 1 describes a data carrier containing "information-voltage generating means that are arranged to receive a control signal . . . and that are arranged to generate the information voltage by using the control signal." *Id.* at 8:66–9:3. Claim 1 further states that the data carrier is "characterized in that the information-voltage generating means have voltage-raising means that are arranged to raise the voltage value of the control signal." *Id.* at 9:3–5. The term "information-voltage generating means" also appears in terms 3, 4, and 6.

The parties dispute the meaning of the term "information-voltage generating means that are arranged to receive a control signal . . . and that are arranged to generate the information

voltage by using the control signal." The parties first dispute whether this is a means-plus-function claim subject to the strictures of § 112, ¶ 6. Impinj insists that this is a means-plus-function limitation subject to § 112, ¶ 6. Dkt. # 135 at 18. NXP disagrees. Dkt. # 137 at 22. Instead, NXP believes that the term should be given its plain and ordinary meaning, or "a circuit that receives a control signal and generates the information voltage by using the control signal." *Id.* And if the Court construes the term to be a means-plus-function claim, the parties dispute which structure(s) would qualify as corresponding structure.

The term uses the word "means." There is thus a presumption that the claim contains a means-plus-function limitation subject to § 112, ¶ 6. *Egenera*, 972 F.3d at 1372 ("We presume that claim terms with the word 'means' invoke § 112(f)."). But the Federal Circuit has cautioned that "the essential inquiry is not merely the presence or absence of the word 'means.'" *Williamson*, 792 F.3d at 1348. Rather, the "essential inquiry" is "whether the words of the claim are understood by persons of ordinary skill in the art to have a sufficiently definite meaning as the name for structure." *Id.* (citation omitted). "To determine whether a claim recites sufficient structure, it is sufficient if the claim term is used in common parlance or by persons of skill in the pertinent art to designate structure, even if the term covers a broad class of structures and even if the term identifies the structures by their function." *Skky*, 859 F.3d at 1019 (citation and quotation marks omitted).

The Court concludes that the "means" presumption has not been rebutted and that the term is a means-plus-function limitation subject to § 112, ¶ 6. There is no evidence that the term "information-voltage generating means" or similar terms are used "in common parlance or by persons of skill in the pertinent art to designate structure." *Id.* (citation and quotation marks omitted). Nor is there any evidence that the term serves as "the name of a sufficiently definite structure" or that "the words of the claim are understood by persons of ordinary skill in the art to

have a sufficiently definite meaning as the name for structure." *Williamson*, 792 F.3d at 1349, 1351. Rather, the claim language is predominantly functional, not structural. The claim seeks to capture virtually any means that can perform the function of "generat[ing] the information voltage by using the control signal." Impinj summarizes it well: "[T]he claim language does not set forth what structure in the claimed circuit performs this function. It recites only what it *does*." Dkt. # 135 at 19. Thus, the claim is a means-plus-function claim subject to § 112, ¶ 6.

NXP responds that the claim term—read as a whole—conveys adequate structure. For example, in addition to the claim's functional language, claim 1 also describes the information-voltage generating means as "receiv[ing] a control signal" and containing within it a "voltage-raising means." '097 Patent at 8:66–9:6. By describing the input and at least one element of the information-voltage generating means, NXP says that the term is not governed by § 112, ¶ 6.

But this language does not convey adequate structure. To be sure, the language *partially* describes the structure and operation of the information-voltage generating means; it explains one element (voltage-raising means) and an input (a control signal). But a circuit component that intakes a control voltage and applies "voltage-raising means" is insufficient to perform the function of "generating" an "information voltage." *See TriMed, Inc. v. Stryker Corp.*, 514 F.3d 1256, 1259 (Fed. Cir. 2008) ("If, in addition to the word 'means' and the functional language, the claim recites sufficient structure for performing the described functions *in their entirety*, the presumption of § 112 ¶ 6 is overcome" (emphasis added)); *Micro Chem., Inc. v. Great Plains Chem. Co.*, 194 F.3d 1250, 1257 (Fed. Cir. 1999) (rebuttal of the means-based presumption requires the claim to provide "sufficient structure . . . to *perform the claimed function*" (emphasis added)); *MTD Products*, 933 at 1343 (noting that while a portion of the claim language discussed structure, another portion was written in functional terms, which "tends to favor [the] position that § 112, ¶ 6 applies"). Such a component would be nothing more than "voltage-raising

means." If the "information-voltage generating means" were merely "voltage-raising means" that receive a certain input, the patent would have no need to describe an "information-voltage raising means" at all. And as described in the specification, other features are necessary to generate an information voltage, including a charging-current generating stage and some form of voltage-limiting means. '097 Patent, 3:60–4:29. Even though the claim "describe[s] certain inputs and outputs at a very high level," the claim language does not sufficiently "inform the structural character of the limitation-in-question or otherwise impart structure." *Williamson*, 792 F.3d at 1351.

NXP also points to the declaration of its expert witness, Dr. Madisetti, to support its conclusion that § 112 ¶ 6 does not apply. Dr. Madisetti opined that "this term is used in common parlance by persons of skill in pertinent art to describe a structure (not a function) because information-voltage generating structures were well known by POSITAs at the time of the invention." Dkt. # 137-4 at 38. He also opined that circuits that generate an information voltage were "well-known in the art." *Id.*

Dr. Madisetti's declaration does not rebut the means-based presumption. First, Dr. Madisetti's declaration identifies the wrong inquiry. It is not enough that information-voltage generating circuits were "well-known in the art" or that a POSITA could devise such a circuit. *Cf. Blackboard*, 574 F.3d at 1384–85 (in the context of determining corresponding structure, observing that it was not enough that "a person of skill in the art could devise some means to carry out the recited function"). Rather, the relevant inquiry is whether the language in the claim conveys sufficiently definite structure or otherwise serves as the name for structure or a class of structures. *TriMed*, 514 F.3d at 1259–60 ("Sufficient structure exists when the claim language specifies the exact structure that performs the functions in question."); *Skky*, 859 F.3d at 1019; *Williamson*, 792 F.3d at 1349–51.

Second, Dr. Madisetti's statement that the "term is used in common parlance by persons of skill in the pertinent art to describe a structure (not a function)" is conclusory. *See* Dkt. # 137-4 at 38. Dr. Madisetti does not cite any evidence or provide any explanatory basis for his conclusion. He does not, for example, point to other instances when the term was used by members of the scientific community. Nor does he provide examples of the types of structures that a POSITA would understand to be disclosed by the term. Because Dr. Madisetti provides no basis or reasoning to support his opinion, the Court concludes that his conclusory statements do not suffice to overcome the means-based presumption. *See Diebold Nixdorf, Inc. v. Int'l Trade Comm'n*, 899 F.3d 1291, 1300–01 (Fed. Cir. 2018) (disregarding conclusory expert opinion that a term would convey structure to a POSITA when the opinion was not supported by extrinsic or other evidence); *cf. Intell. Sci. & Tech., Inc. v. Sony Elecs., Inc.*, 589 F.3d 1179, 1184 (Fed. Cir. 2009) (in the context of a summary judgment motion for infringement, concluding that "[a]n expert's unsupported conclusion on the ultimate issue of infringement will not alone create a genuine issue of material fact"); *Telemac Cellular Corp. v. Topp Telecom, Inc.*, 247 F.3d 1316, 1329 (Fed. Cir. 2001) ("Broad conclusory statements offered by Telemac's experts are not evidence and are not sufficient to establish a genuine issue of material fact."). As the Federal Circuit explained in *Phillips*, "conclusory, unsupported assertions by experts as to the definition of a claim term are not useful to a court." 415 F.3d at 1318. There is no reason that this principle should not apply equally to an expert's unsupported statement that a POSITA would understand the term in question to convey structure.[8] Accordingly, the Court concludes that the term "information-voltage generating means . . ." invokes § 112, ¶ 6.

[8] The Court notes, however, that Impinj did not submit its own expert declaration as to this patent term. But because Dr. Madisetti's declaration is conclusory, the Court does not believe that this is dispositive.

The Court must next determine the claimed function of the term. *Williamson*, 792 F.3d at 1351. Impinj proposes the following function: "generat[ing] the information voltage by using the control signal, by e.g. receiving a control signal CS of a voltage at most equal to the supply voltage." Dkt. # 135 at 18. NXP does not propose a function, but criticizes Impinj's construction for failing to adhere to the claim language. Dkt. # 150 at 13. While the Court does not see any meaningful substantive difference between the claim language and Impinj's proposed function, the Court agrees that the function could be drafted in a manner that tracks the claim language more closely and reads more naturally. Therefore, the Court determines that the function is: "generating an information voltage by receiving and using a control signal that is of a voltage value that is at most equal to the value of the supply voltage." *See* '097 Patent, 8:65–9:6 (using similar language in the patent claims).

Once a court has determined that § 112, ¶ 6 applies and determines the claimed function, then "the court must determine what structure, if any, disclosed in the specification corresponds to the claimed function." *Williamson*, 792 F.3d at 1351. "Structure disclosed in the specification qualifies as 'corresponding structure' if the intrinsic evidence clearly links or associates that structure to the function recited in the claim." *Id.* at 1352 (citation omitted).

Impinj proposes the following as corresponding structure: "'a charging-current generating stage 7 implemented in the form of an n-channel field effect transistor connected to storage capacitor 5A, voltage raising means 8, and voltage-limiting means 9,' as described in Fig. 2 elements 6, 7, 8, and 9, 3:60–4:51." Dkt. # 135 at 18. NXP rejects Impinj's proposed structure because it "improperly identifies structure that is unnecessary to perform the claimed function." Dkt. # 150 at 13. This, NXP says, is impermissible because a court may not incorporate "structure from the written description beyond that necessary to perform the claimed

function." *Micro Chem.*, 194 F.3d at 1258. Instead, NXP says that claims 1 and 4 expressly limit the necessary structure to "voltage-raising means."

The Court rejects NXP's proposed structure and rejects Impinj's proposed structure in part. NXP's proposed corresponding structure—"voltage-raising means"—does not suffice to carry out the function of "generating" an "information voltage." As discussed above, if an information voltage could be generated using only "voltage-raising means," then the term "information-voltage generating means" would be superfluous; it would be nothing more than a synonym for "voltage-raising means." And as described in the specification, generating an information voltage requires more than just a means for raising the voltage. '097 Patent, 3:60–4:29.

The Court agrees with portions of Impinj's proposed structure. The Court agrees with Impinj that the specification describes an "information-voltage generating means" with three basic components: (1) a "charging-current generating stage," (2) voltage-raising means, and (3) voltage-limiting means." *See* '097 Patent, 3:60–4:29. But Impinj says that the "charging-current generating stage" must be of a particular form: "an n-channel field effect transistor connected to storage capacitor." The Court rejects this as excessively narrow. The specification discloses the corresponding structure of a "charging-current generating stage" before describing a particular form that can "implement[]" that structure (the "n-channel field effect transistor"). Impinj has not explained why the patentee is not entitled to the broader structure of "charging-current generating stage." This broader structure is clearly linked to the claim term. The specification states that the information-voltage generating means "*have* a charging-current generation stage." *Id.* at 3:66–67 (emphasis added); *cf. Micro Chem.*, 194 F.3d at 1258 ("When multiple embodiments in the specification correspond to the claimed function, proper application of § 112, ¶ 6 generally reads the claim element to embrace each of those embodiments.").

Accordingly, the Court determines that the corresponding structure is: "a charging-current generating stage, voltage-raising means, and voltage-limiting means" and equivalents thereof.[9]

In conclusion, the Court construes this term to be a means-plus-function limitation subject to § 112, ¶ 6. The Court concludes that the function is "generating an information voltage by receiving and using a control signal that is of a voltage value that is at most equal to the value of the supply voltage." The Court concludes that the corresponding structure disclosed in the specification is "a charging-current generating stage, voltage-raising means, and voltage-limiting means" and equivalents thereof.

2. "voltage-raising means that are arranged to raise the voltage value of the control signal"

According to the '097 Patent, the "information-voltage generating means" contain "voltage-raising means." The term "voltage-raising means" appears in independent claims 1 and 4, as well as dependent claims 2 and 5. For example, claim 1 describes "information-voltage generating means . . . that are arranged to generate the information voltage by using the control signal, characterized in that the information-voltage generating means have *voltage-raising means* that are arranged to raise the voltage value of the control signal." '097 Patent, 8:66–9:5 (emphasis added).

The parties dispute whether this is a means-plus-function term subject to § 112, ¶ 6. Impinj says that the term is governed by § 112, ¶ 6. Dkt. # 135 at 21. NXP disagrees, instead arguing that the term be given its plain and ordinary meaning, which it interprets to be "a circuit that raises the voltage value of the control signal." Dkt. # 137 at 24. And if the Court construes

[9] As explained in the following section, the Court concludes that the term "voltage-raising means" as used in the '097 Patent refers to "a charge pump or the float-based structure described at 2:43–48 of the '097 Patent."

the term to be a means-plus-function limitation, the parties further dispute what structure(s) in the specification qualify as corresponding structure.

The Court construes the "voltage-raising means . . ." term to be a means-plus-function limitation subject to § 112, ¶ 6. The claim uses the word "means." This creates a presumption that the limitation is a means-plus-function claim subject to § 112, ¶ 6. *Egenera*, 972 F.3d at 1372. When patentees use the term "means," courts presume that they did so deliberately. *See Rodime PLC v. Seagate Tech., Inc.*, 174 F.3d 1294, 1302 (Fed. Cir. 1999) ("[T]his court has presumed an applicant *advisedly* used the word 'means' to invoke the statutory mandates for means-plus-function clauses." (emphasis added)). This presumption has not been rebutted.

The claim language itself conveys no structure; it instead describes any device capable of performing the function of "rais[ing] the voltage of the control signal." While the Federal Circuit has held that certain introductory phrases preceding the word "means" can help rebut the presumption, *see, e.g.*, *Envirco Corp. v. Clestra Cleanroom, Inc.*, 209 F.3d 1360, 1365 (Fed. Cir. 2000) (holding that "baffle means" adequately conveyed the structure of "baffle"), the introductory language used here—"voltage-raising"—does not convey structure. Rather, the introductory "voltage-raising" phrase is purely functional, merely repeating the function of "rais[ing] the voltage" that comes after the word "means." In other words, the claim does not meaningfully differ from a claim that omits the introductory phrase "voltage-raising" and instead reads: a "means . . . arranged to raise the voltage value of the control signal." When rephrased in this manner, it becomes clearer that the term is functional, not structural.

As with the prior term, NXP relies heavily on the declaration of its expert witness, Dr. Madisetti, who opined:

> A POSITA would understand that such a voltage-raising means are "a circuit that raises the voltage value of the control signal." Such circuits were well-known in the art. For example, a POSITA would have understood that voltage values could

> be raised using a charge pump or a voltage multiplier that was well known in the art.

Dkt. # 137-4 at 41. But the Court finds Dr. Madisetti's opinion insufficient for the same reasons identified for the "information-voltage raising means" term. First, a term does not convey structure—and thus avoid § 112, ¶ 6—merely because a POSITA could think of some device that can perform the voltage-raising function. The fact that a POSITA could identify two such structures (a charge pump and a voltage multiplier) that can perform the claimed function does not prove that the claim term is structural or serves as the name for a class of structures. *See TriMed*, 514 F.3d at 1259–60 ("Sufficient structure exists when the claim language specifies the exact structure that performs the functions in question."); *cf. Blackboard*, 574 F.3d at 1384–85 (in the context of determining corresponding structure, observing that it was not enough that "a person of skill in the art could devise some means to carry out the recited function"). Second, Dr. Madisetti provided no explanation or basis for his opinion, rendering it conclusory. *See Diebold*, 899 F.3d at 1300–01 (disregarding conclusory expert opinion that a term would convey structure to a POSITA when the opinion was not supported by extrinsic or other evidence).[10]

NXP also cites the Federal Circuit's decision in *Lighting Ballast Control LLC v. Philips Electronics North Am. Corp*. 790 F.3d 1329 (Fed. Cir. 2015). In that case, the Federal Circuit held that the district court did not clearly err when it concluded that the term "voltage source means" was not a means-plus-function limitation. *Id.* at 1336, 1338–39. To be sure, that term bears at least some facial similarity to the "voltage-raising means" term at issue here. But *Lighting Ballast* is distinguishable on at least two grounds.

[10] The Court notes that Impinj did not submit its own expert declaration as to this term, either. But as with the prior term, Dr. Madisetti's declaration is conclusory. Thus, the Court does not believe that this is dispositive.

First, the court pointed to unrebutted testimony that the term referred to one particular type of device: a "rectifier." *Id.* at 1338–39. By contrast, Dr. Madisetti did not state that a POSITA would understand the term to mean a particular, definite structure or class of structures. Rather, he stated only that a POSITA might know of several different means of raising the voltage, like a charge pump or voltage multiplier.[11] And there are apparently more means of raising voltage: As NXP identifies, the specification explains that the voltage can be raised by allowing the voltage source to "float in relation to a reference potential," which allows the control voltage to "be raised by a desired amount." '097 Patent, 2:44–48. The variety of means by which to raise the control voltage distinguishes this term from the term in *Lighting Ballast*.

Second, the claim in *Lighting Ballast* contained additional language that conveyed structure. The claim stated that the voltage source means "provid[ed] a constant or variable magnitude DC voltage between the DC input terminals." The court accepted the district court's conclusion that a POSITA would understand that a rectifier was the "only structure that would provide 'a constant or variable magnitude DC voltage.'" *Id.* at 1339. By contrast, there is no additional claim language here that would convey structure to a POSITA.

Accordingly, the Court concludes that the "voltage-raising means . . ." limitation is a means-plus-function term subject to § 112, ¶ 6. *Cf. Atmel* 198 F.3d at 1376 (neither party appealing the district court's conclusion that "high voltage generating means" is a means plus function claim); *Lufthansa Technik AG v. Astronics Advanced Elec. Sys. Corp.*, No. C14-1821RSM, 2016 WL 1626687, at *5 (W.D. Wash. Apr. 25, 2016) (noting that the parties agreed

[11] At the *Markman* hearing, Impinj observed that the '951 Patent—another patent at issue in this case—expressly equates a "charge pump" with a "voltage multiplier." *See* '951 Patent, 1:15–17; Dkt. # 244 at 116. As stated below, the Court determines that the corresponding structure includes a "charge pump." Therefore, to the extent that a voltage multiplier is equivalent to a charge pump, the Court's construction captures *all* of the structures identified by Dr. Madisetti.

that "means for supplying supply voltage . . . arranged for" was a means-plus-function term); *Agere Sys., Inc. v. Broadcom Corp.*, No. CIV.A.03-3138, 2004 WL 1658530, at *30 (E.D. Pa. July 20, 2004) (holding that "voltage clamping means" is a means-plus-function term).

Once a court has determined that § 112, ¶ 6 applies, it must then determine the claimed function. *Williamson*, 792 F.3d at 1351. The claimed function is straightforward: "raising the voltage value of the control signal."

Finally, the court must identify the corresponding structure. *Id.* Impinj suggests the following corresponding structure:

> A charge pump which has: a charge-pump capacitor 11 connected between the Supply Voltage V and the reference potential GND as a result of which the voltage applied to the charge-pump capacitor 11 assumes the value of the supply voltage V; a first switch 12 and a second switch 13 implemented in the form of field effect transistors, arranged to switch over from their rest state to an active state, as is indicated in FIG. 2 by broken lines if control signal CS is received," as described in Fig. 2, element 8, 4:30–48.

Dkt. # 135 at 17. NXP responds that Impinj's proposed structure omits at least one other corresponding structure. Dkt. ## 137 at 25; 150 at 14–15.

The Court agrees with NXP that Impinj's proposed corresponding structure is too narrow. First, the specification discloses a charge pump in general; it does not disclose only the specific charge pump described by Impinj. The specification states, for example, that "it has . . . proved particularly advantageous if the voltage raising means are implemented in the form of a charge pump." '097 Patent, 2:48–50. This passage and others like it "clearly link[]" a particular structure—a generic charge pump—to the voltage-raising function. *Williamson*, 792 F.3d at 1352 (citation omitted). Moreover, dependent claims 2 and 5 both describe voltage-raising means that "are implemented *in the form of a charge pump* that is arranged to raise the voltage value of the control signal by the value of the supply voltage." '097 Patent, at 9:8–10 (emphasis added); 10:11–13. While this claim language does modestly limit the type of charge pump (by

stating that the charge pump must be "arranged to raise the voltage value of the control signal by the value of the supply voltage"), Impinj has presented no reason to believe that the very particular charge pump described in part of the specification is the only charge pump that can complete the claimed function. Thus, it would be improper to interpret the independent claim as limited to a particular form of charge pump when the dependent claims undeniably include definite structure in the form of a generic charge pump. While an independent claim containing a means-plus-function limitation need not be interpreted as *broader* than a dependent claim, *see Medtronic, Inc. v. Advanced Cardiovascular Sys., Inc.*, 248 F.3d 1303, 1313 (Fed. Cir. 2001), it would be odd to conclude that the independent claim is *narrower* than the dependent claim containing definite structure. The presence of claims 2 and 5 clearly link the term "voltage-raising means" to a generic charge pump that is capable of raising the control voltage.

Second, NXP points to a reference in the specification to another method for voltage raising. The specification states:

> In the case of the solutions according to the invention, provision may for example be made for the voltage-raising means to be formed by a voltage source that can be operated to float in relation to a reference potential of the circuit by which the value of the control-signal voltage can be raised by a desired amount.

'097 Patent at 2:43–48; Dkt. # 150 at 14–15. Impinj's reply brief does not respond to NXP's argument. At the *Markman* hearing, Impinj's counsel indicated that he was not sure that Impinj's proposed construction excluded this float-based method. Dkt. # 244 at 117–18. To avoid any doubt, the Court agrees that this sentence clearly links or associates a float-based structure to "voltage-raising means." Accordingly, the Court construes the corresponding structure as "a charge pump or the float-based structure described at 2:43–48 of the '097 Patent."

In conclusion, the Court construes this term to be a means-plus-function limitation subject to § 112, ¶ 6. The Court concludes that the function is "raising the voltage value of the

control signal." The Court concludes that the corresponding structure disclosed in the specification is "a charge pump or the float-based structure described at 2:43–48 of the '097 Patent" and equivalents thereof.

C. The '951 Patent

1. "regulating an output voltage at the output of the input level regulator to a continuous range of voltage levels"

The '951 Patent describes a voltage multiplier circuit in which the voltage is "regulated." As described above, one such source of regulation in the voltage multiplier circuit is the "input level regulator," which receives an input from "a feedback bias control circuit" and outputs a signal to the first of several voltage multiplier stages. '951 Patent, 3:22–32. The parties dispute the construction of claim language related to this input level regulator. In claim 1, for example, the '951 Patent states that "the feedback bias control circuit generates a feedback signal for regulating an output of the input level regulator to a continuous range of voltage levels based on a comparison between a voltage proportional to a voltage at the output of the second clocked multiplier stage and a reference voltage." *Id.* at 10:53–59. The parties dispute the meaning of the term "regulating an output of the input level regulator to a continuous range of voltage levels," which also appears in similar form in claims 9 and 16.

NXP argues that no construction is necessary, and that the term should be given its plain and ordinary meaning. Dkt. # 137 at 26. Impinj proposes a construction of "an output voltage capable of being commanded to transition directly between any two distinct voltage levels in the range." Dkt. ## 135 at 24–25; 149 at 13–14. While the Court finds that construction is necessary because the term could confuse a jury, the Court also rejects Impinj's proposed construction. The Court interprets a slightly broader term—"a feedback signal for regulating an output of the input level regulator to a continuous range of voltage levels"—to mean "a feedback

signal that is fed into an input level regulator, which then uses the feedback signal to regulate a voltage that varies within a continuous range of voltage levels."

As described in the specification, a feedback bias control circuit produces a "feedback bias control signal" or "feedback signal." '951 Patent, 4:17–28. This feedback signal is then fed into other components of the voltage multiplier, such as the input level regulator. *See id.* at 3:22–32 (input level regulator having a "feedback bias control input"). Based on the feedback signal, the input level regulator outputs a voltage value, which is then fed into the first voltage stage. *Id.* at 3:29–32 (producing a "regulated voltage on signal line 34 in response to . . . the feedback bias control signal"), 5:26–36. Importantly, the input level regulator does not merely output a voltage to two discrete voltages, say 0V or 1V. Rather, the claims of the patent emphasize that the input level regulator can output a voltage to a "continuous range" of voltages. *See, e.g.*, *id.* at 10:56.

Impinj seeks a construction that the output voltage of the input level regulator transitions "between any two distinct voltage levels in the range." Theoretically, it may be true that the voltage transitions "between any two distinct voltage levels" in some embodiment of the invention—it might change from .5V to .7V, for example. But such a construction draws attention away from the inventive element of the '951 Patent: the ability to produce a voltage within a *continuous range* of voltages. Dkt. # 150 at 16. Impinj seems not to dispute that the '951 Patent can produce a voltage across a range of voltages. *See* Dkt. # 149 at 13 ("The parties agree that the input level regulator of the recited voltage multiplier can regulate its own output voltage across all voltage levels within a range."). In light of that concession, it is unclear why Impinj believes that the term should be construed to emphasize that the voltage transitions "between two distinct voltages." Impinj identifies nothing in the specification or claims to support such a construction.

Impinj cites prosecution history to support its argument. *See Phillips*, 415 F.3d at 1317 (permitting consideration of prosecution history during claim construction). But the prosecution history does not provide any support for Impinj's use of the phrase "between two distinct voltages." During patent prosecution, the patentee distinguished the '951 Patent from prior art by observing that the prior art did not contain an input level regulator that regulates an output voltage to a "range of voltage levels," and that the first stage of the prior art enabled only a binary output (i.e., "on" or "off"). Dkt. ## 136-3 at 7–8; 136-6 at 15. The patent examiner agreed, stating that "'regulating an output voltage . . . to a continuous range of voltage levels' is to be interpreted as an output voltage being regulated to a value within a continuous range of voltage levels, wherein the continuous range of voltage levels comprises all voltage levels within the end points of said continuous range." Dkt. # 137-2 at 3. As NXP states, it was the *prior art* that "was limited to two values, not the claimed invention, which explicitly applies to a range." Dkt. # 150 at 16. The patent prosecution makes clear that any construction of the term should highlight the ability of the input level regulator to produce a range of different voltage outputs and should not focus on "two distinct voltages."

Impinj also argues that the output voltage is "commanded" to transition between various voltages. NXP correctly observes in its briefing that the term "commanded" does not appear in the '951 Patent. Dkt. # 137 at 27. At the *Markman* hearing, Impinj agreed that the term "commanded" is an awkward fit for this term, but that its construction sought to capture the notion that the output voltage is determined by the feedback signal, which is an input to the input level regulator. Dkt. # 244 at 128. It is not clear that NXP disputes this point (though it believes that "commanded" is ambiguous). NXP stated at the *Markman* hearing that "there's a feedback circuit that sends . . . some signal back based on what the load is at the output that gets taken into account by the input level regulator, which then outputs that 34 signal to the first stage." *Id.* at

120; *see also* Dkt. # 150 at 16 ("the input level regulator has two inputs . . . which regulate the voltage at the output of the input level regulator").

To the extent that there is any disagreement, the Court recognizes Impinj's general point. The claim discusses a "feedback signal" that is used "for regulating an output voltage" of the "input level regulator." '951 Patent, 10:54–56. In this context, the feedback signal "regulate[s]" the output voltage by affecting it in some way. Based on this claim language, the input level regulator receives a feedback signal and uses that feedback signal to help determine the voltage (within a continuous range of voltages) to be outputted. The Court also agrees that the term "commanded" makes for an awkward fit. The Court's construction takes these considerations into account by observing that the feedback signal "is fed into an input level regulator" and that the input level regulator "uses the feedback signal to produce a voltage that varies within a continuous range of voltage levels."

Accordingly, the Court construes "a feedback signal for regulating an output of the input level regulator to a continuous range of voltage levels" to mean "a feedback signal that is fed into an input level regulator, which then uses the feedback signal to regulate a voltage that varies within a continuous range of voltage levels."

2. "regulated clock"

The parties dispute the meaning of the term "regulated clock" as used in claims 9 and 16 of the '951 Patent. The claims describe a series of "regulated clock[s]" that are coupled to each multiplier stage. '951 Patent, 11:35–42, 12:32–35. In one embodiment, the regulated clock operates in response to a clock input signal, a supply voltage, and the feedback signal produced by the feedback bias control circuit. '951 Patent, 5:26–35; Dkt. # 137 at 27–28.

NXP argues that no construction is necessary, and that the term should be given its plain and ordinary meaning. Dkt. # 137 at 27. Impinj argues that the term should be construed as "a

clock signal with a signal amplitude determined by the feedback from the voltage multiplier circuit." Dkt. # 135 at 25. Because the Court is construing the noun "regulated clock," the Court interprets Impinj's proposed construction as "*a clock that produces a* signal with a signal amplitude determined by the feedback from the voltage multiplier circuit." The Court construes the term "regulated clock" to mean "a clock that is regulated based on feedback from the voltage multiplier circuit."

The term "regulated clock" must mean something more than a basic "clock." This is because "claim constructions [should ideally] give meaning to all of a claim's terms." *Apple, Inc. v. Ameranth, Inc.*, 842 F.3d 1229, 1237 (Fed. Cir. 2016). The plain meaning of "regulated clock" is a clock that is *regulated* in some manner. And for a clock to be regulated, something must provide the regulation or do the regulating. Here, the thing that regulates (that is, adjusts or controls) the output of the clock is feedback from other components in the voltage multiplier circuit. For example, the specification describes one embodiment in which the "[r]egulated clock circuit 20 operates in response to the clock (CLK), the supply voltage (V*SUPPLY*), and the feedback bias control signal 58 for outputting the regulated clock output on signal line 38." '951 Patent, 5:32–34. The claims track the description. Claim 9, for example, describes a "first regulated clock" in which the regulated clock is coupled with the feedback bias control circuit "such that the feedback signal affects an output voltage of the first regulated clock." *Id.* at 11:35–36, 11:52–55.

From the specification and claim language, it is clear that feedback from the voltage multiplier circuit regulates the clock. This aligns with NXP's presentation during the *Markman* hearing in which counsel stated that "'[r]egulated' generally means there's some sort of feedback," and that "when something's regulated, it takes in feedback, and so what it's outputting is affected by that feedback." Dkt. # 244 at 132. Importantly, however, the claims

describe slightly different arrangements for the regulated clock. Claim 9 states that the regulated clock is coupled to the feedback bias control circuit, *see* '951 Patent, 11:53–54, while claim 16 lacks this limitation (which instead appears in dependent claim 17), *see id.* at 12:25–52. Therefore, the Court's construction recognizes that the claims do not consistently identify the source of the regulation; they instead suggest only that feedback from the voltage multiplier circuit as a whole regulates the clock in some manner. A narrower construction would impermissibly import the specification's limits into the claims and would ignore differences between the claims. *See SciMed*, 242 F.3d at 1340; *Phillips*, 415 F.3d at 1314.

It is unclear whether NXP's "plain and ordinary meaning" construction captures this concept. NXP says that the Court need not construe this term because claim 9 includes a limitation in which the "feedback signal affects an output voltage of the [] regulated clock." Dkt. # 150 at 17. But in its briefing, NXP says that a "regulated clock" is a "clock circuit that *may* be regulated." Dkt. # 137 at 22–23 (emphasis added). A regulated clock *must* be regulated in some manner. And claim 16—unlike claim 9—lacks specificity about how the clock is regulated or the input source(s) of the clock. To avoid any ambiguity, the Court finds that construction is necessary to emphasize that the clock must be regulated in some manner.

Impinj asks the Court to go further. It suggests that the proper construction of the term "regulated clock" emphasizes that feedback from the voltage multiplier circuit affects the "signal amplitude" of the clock's output. Dkt. # 135 at 26–27. Impinj's argument is based on prosecution history. In its appeal brief to the U.S. Patent and Trademark Office, the patentee attempted to distinguish the '951 Patent from a prior patent filed by Ragone et al. The patentee stated that:

> Ragone et al. does not show or suggest "wherein the feedback bias control circuit is further coupled to the [first/second/third/fourth] regulated clock, such that the feedback signal affects an output voltage of the [first/second/third/fourth]

> regulated clock . . . ." Ragone et al. only switches the clock on and off to the pump stages. Ragone et al. does not affect the magnitude of the clock as claimed in claim 9.

Dkt. # 136-6 at 16 (quoting '951 Patent, claim 9).

By distinguishing the Ragone et al. patent on the grounds that it does not "affect the magnitude of the clock as claimed in claim 9," Impinj asserts that the patentee limited the scope of the term to forms of regulation that alter the clock's "signal amplitude."

A patentee's statements during patent prosecution can serve as a disclaimer of the scope of the patent, "precluding patentees from recapturing through claim interpretation specific meanings disclaimed during prosecution." *Omega Eng'g, Inc, v. Raytek Corp.*, 334 F.3d 1314, 1323 (Fed. Cir. 2003). But courts "decline[] to apply the doctrine of prosecution disclaimer where the alleged disavowal of claim scope is ambiguous." *Id.*; *see also Thorner*, 669 F.3d at 1366 (observing that "[t]he standard for disavowal of claim scope is . . . exacting"). "Absent a clear disavowal in the specification or the prosecution history, the patentee is entitled to the full scope of its claim language." *Home Diagnostics*, 381 F.3d at 1358.

The prosecution history cited by Impinj does not rise to a "clear disavowal" of any clock that does not affect the magnitude or amplitude of the output. First, it is unclear what feature of the '951 Patent was being distinguished from Ragone et al. The prosecution history states that "Ragone et al. does not show or suggest 'wherein the feedback bias control circuit is further coupled to the first regulated clock, such that the feedback signal affects an output voltage of the first regulated clock." Dkt. # 136-6 at 16 (quoting '951 Patent, claim 9). From this, it is unclear whether the patentee was trying to distinguish Ragone et al. from a generic "regulated clock," or whether the patentee was trying to say that Ragone et al. lacked a regulated clock *with a feedback signal that affects the output of the regulated clock*. If the patentee intended to do only the latter, examination of the claims reveals the flaw in Impinj's interpretation. While claim 9

describes a regulated clock with an "output voltage" that is "affect[ed]" based on a feedback signal, claim 16 lacks such a limitation, describing instead a generic "regulated clock." The limitation involving a feedback signal appears in claim 17, which is a dependent claim of claim 16. Thus, while claim 16 requires that the clock be regulated in some fashion, it does not necessarily require regulation of the output voltage magnitude. *See AK Steel*, 344 F.3d at 1242 ("[D]ependent claims are presumed to be of narrower scope than the independent claims from which they depend."). The ambiguity of the prosecution history is exacerbated by the fact that the patentee only made this statement about claim 9; the statement does not involve claim 16 (which, again, contains different language than claim 9).

Second, it is at least plausible that the patentee only meant to suggest one possible manner by which the clocks in the '951 Patent could be regulated, contrasting that method of regulation with the on/off clocks described by Ragone, et al. Because the prosecution history is ambiguous, the Court concludes that it does not amount to clear disavowal of patent scope. "When the alleged disclaimer is ambiguous or amenable to multiple reasonable interpretations, [the court] decline[s] to find prosecution disclaimer." *Core Wireless Licensing S.A.R.L. v. LG Elecs., Inc.*, 880 F.3d 1356, 1367 (Fed. Cir. 2018).

Accordingly, the Court construes the term "regulated clock" to mean "a clock that is regulated based on feedback from the voltage multiplier circuit."

3. "proportional"

The parties dispute the meaning of the term "proportional" as the term appears in at least claims 1, 9, and 16. An exemplary use of the term appears in claim 1 of the '951 patent, which describes a "feedback bias control circuit" that "generates a feedback signal . . . based on a comparison between a voltage *proportional* to a voltage at the output of the second clocked multiplier stage and a reference voltage." '951 Patent, 10:53–59 (emphasis added). The

specification describes a feedback bias control circuit that produces a control signal that is based on a comparison between (1) a voltage "proportional" to the output voltage (VOUT) that arrives at the feedback bias control circuit from the last multiplier stage and (2) a reference voltage (VREF). *Id.* at 8:9–13, 4:17–28, 6:1–20. This value informs the control signal, which is outputted to other components of the circuit.

NXP argues that the term does not require construction and should be given its plain and ordinary meaning. Dkt. # 137 at 28. Impinj's position has shifted throughout the claim construction process. Impinj initially proposed a construction of "a fixed or constant ratio to another value." Dkt. # 135 at 27. But in its briefing and at the *Markman* hearing, Impinj appears to advocate for a construction that includes an element of time, such as is a ratio that is "fixed or constant *over a period of time*." Dkt. # 135 at 27 (emphasis added); *see also* Dkt. # 244 at 140. And in Impinj's reply brief, Impinj stated that it *agrees* with NXP that "the ratio can be adjusted at different times," further confusing its position. Dkt. # 149 at 15. The Court construes the term "proportional" to mean "a constant ratio to another value that can be adjusted at different times."

"Proportional" is a common word that carries a common definition: "having the same or a constant ratio." "Proportional," *Merriam-Webster Dictionary*, https://www.merriam-webster.com/dictionary/proportional; *see also* "proportional," *Cambridge Dictionary*, https://dictionary.cambridge.org/us/dictionary/english/proportional ("If two amounts are proportional, they change at the same rate so that the relationship between them does not change."). The key to this common-sense understanding is that the relationship between the two variables is linear and constant. That ratio could be 1:1, 2:1, or 10:1. But the word connotes a linear relationship between two variables.

At the *Markman* hearing, however, NXP clarified that its "plain and ordinary meaning" construction is *not* limited to a linear relationship between variables. Dkt. # 244 at 137. Rather,

NXP believes the term "proportional" captures, for example, logarithmic relationships and exponential relationships, too. *Id.* Such a construction defies the common usage of the word "proportional." Nothing in the patent suggests deviation from this common definition of the term. Moreover, NXP did not make this argument in its briefing, nor did it provide any source (like a dictionary) suggesting that the ordinary meaning of "proportional" covers such concepts. Thus, the first part of the Court's construction—"a constant ratio to another value"—captures the common definition of the word "proportional."

The second portion of the Court's construction—that the ratio "can be adjusted at different times"—is necessary in light of the particular nature of the '951 Patent. While "proportionality" conveys a constant or linear ratio—say, 2:1 or 5:1—a proportion can change over time. And indeed, the '951 Patent allows the ratio to change. In one embodiment, for example, the voltage is modified to be "proportional" to the output voltage by sending the output voltage through a series of resistor dividers. '951 Patent, 4:17–28, 6:1–20. Depending on whether those resistor dividers are opened or closed, the ratio between the output voltage and the "proportional" voltage can change. The Court's construction conveys this feature of the '951 Patent.[12]

NXP argues that Impinj's construction ignores language in the patent that allows for the voltage to "dynamically change." The patent describes a feedback bias control circuit that includes a "switched resistor-divider" or a "switched capacitor-divider" that can be "configured to *dynamically change* a value of the voltage proportional to the voltage at the output of the second clocked multiplier stage." *Id.* at 9:9–20 (emphasis added); *see also id.* at 8:31–38. The

[12] Because the patent describes an invention in which the ratio changes over time, the Court rejects Impinj's modified construction that proportionality refers to a "fixed ratio *over time*." Dkt. # 149 at 15. Such a construction would confuse a jury by implying that the ratio is permanent or semi-permanent, when in fact the ratio can change.

patent discusses this feature in dependent claims 6 and 12. *See id.* at 11:15–17 ("dynamically change a value of the voltage proportional to the voltage at the output"), 12:11–14 (same). The Court's construction incorporates this feature of the patent by allowing the ratio to change or be adjusted over time. It seems that Impinj agrees: its brief concedes that the "proportional" ratio "can be adjusted at different times." Dkt. # 149 at 15; *see also* Dkt. # 136-2 at 22 (Impinj's expert stating that the "constant ratio based on the output voltage that can be switched based on the resistive divider network"). To be sure, "dynamically" suggests that the ratio can change extremely quickly. But nothing in the Court's construction should be read to exclude an embodiment in which the ratio changes quickly or even constantly.

Accordingly, the Court construes the term "proportional" to mean "a constant ratio to another value that can be adjusted at different times."

V.

CONCLUSION

The Court construes the disputed claim terms as described in this order.

Dated this 4th day of November, 2022.

John H. Chun
United States District Judge